Wireless safety logic signal transmission system

SOLUTIONS
radiosafe

RS Series

Typical applications :

Industrial equipment :

➡ Wireless safety signal transmission from a mobile equipment to a control panel.

➡ Supervision of a secure wireless access gate to a dangerous zone.

➡ Wireless emergency stop of a conveyor from a forklift truck.

Industrial lifting :

➡ Wireless safety signal transmission from a machine to a mobile equipment (Travelling cranes, air conveyors,…).

➡ Wireless emergency stop from a control to a mobile equipement.

PEOPLE SAFETY

CE

1- Description

The system comprises a wireless safety transmitter and a wireless safety receiver.

The safety transmitter has the following features :
● 10 self-controlled function inputs,
● 1 emergency stop input ensuring a SIL3 safety level.

The safety receiver has the following features :
● 1 radio input associated to the transmitter.
● 1 two-channel emergency stop input ensuring a SIL3 safety level.
● 1 EDM input (monitoring of main contactors).
● 3 safety outputs associated to the transmitter safety input.
● 6 static outputs associated to the function inputs on the transmitter.
● 2 static outputs for indication of the operating state.
● A selection of application programs (manual or automatic receiver restart).

To further enhance safety when using this system, innovative technical solutions and options are also proposed :
● Infrared start-up validation (option) to ensure identification of the machine started up.
● Choice of operating frequency channel among 64 frequencies in 433-434MHz band.

Easy to maintain :
● Setting and ID code fully stored in a SIM card located in transmitter.
● Diagnostic aid indicator lights.

C O N T E N T S

● **Compliant with European directives and standards :**
  - Hertzian equipment and telecommunication terminals (low voltage, EM compatibility, radiofrequency spectrum)
  - Machinery 2006-42 with SIL3 safety level according to EN 61508-1-7 (2001) EN ISO 13849-1 (2008) for the performance level e (Category 4)
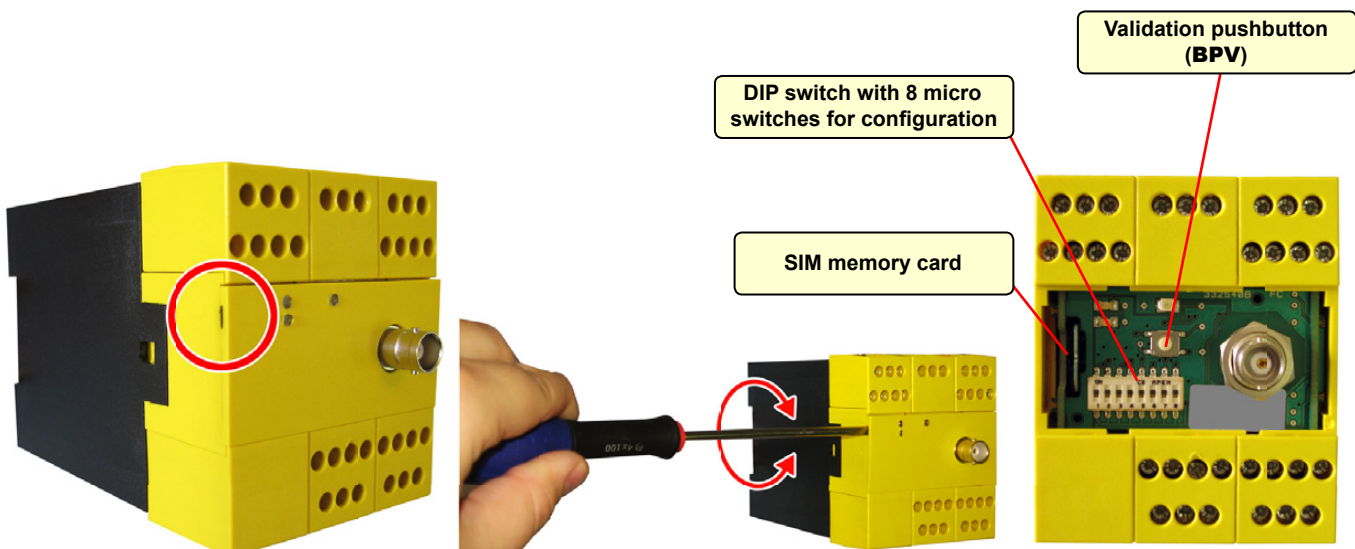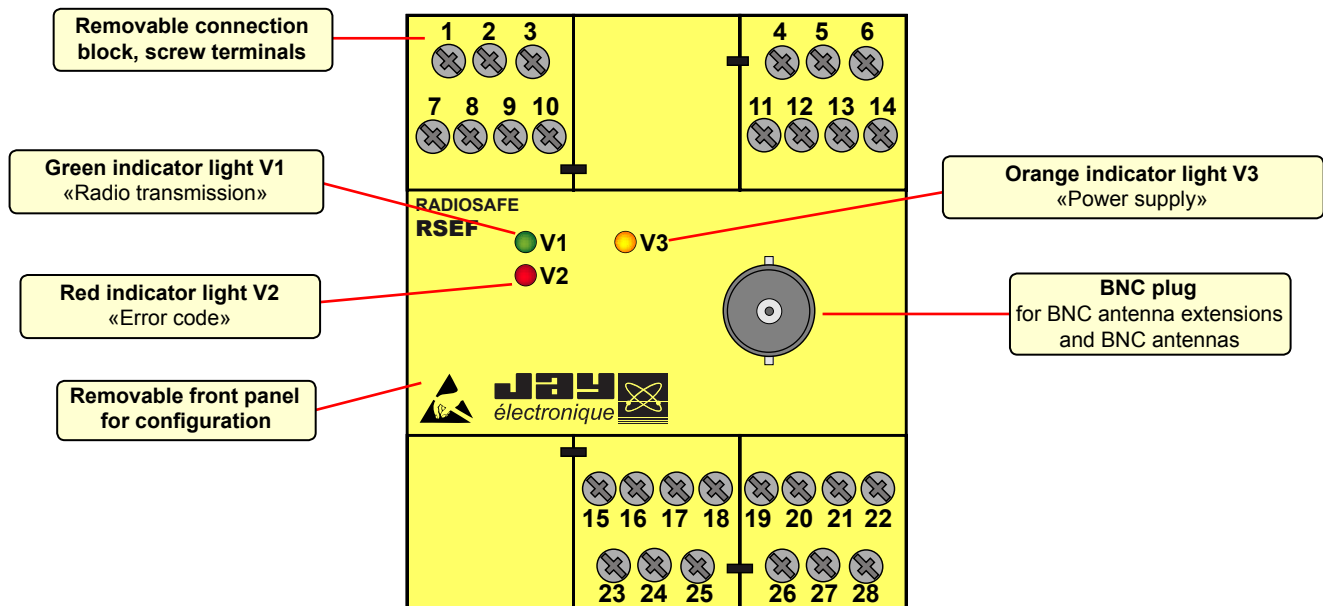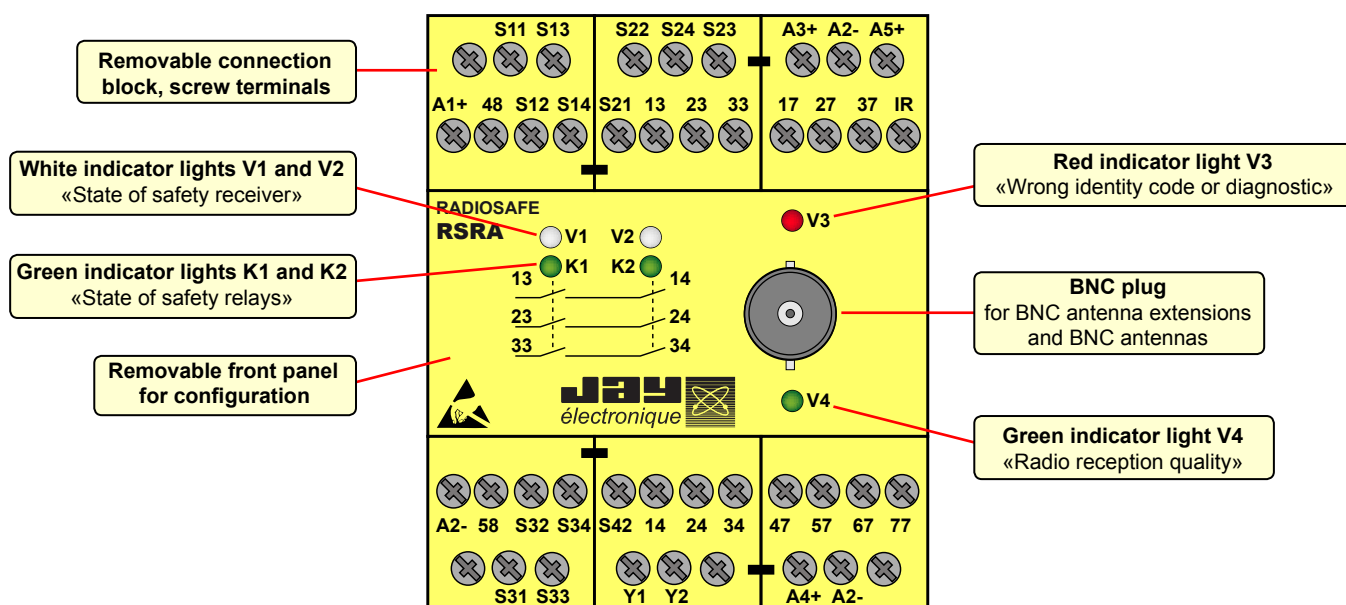 *EC type certificate issued by TÜV Rheinland*

TÜV Rheinland®
Functional Safety
Type Approved
FS

N°01/205/5190/12

Jay
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E680 B - 0112
revision01

2- Functions of the safety transmitter «RSEF»

Transmitter RSEF

Removable connection block, screw terminals

Green indicator light V1 «Radio transmission»

Red indicator light V2 «Error code»

Removable front panel for configuration

Orange indicator light V3 «Power supply»

BNC plug for BNC antenna extensions and BNC antennas

RADIOSAFE
RSEF

V1   V3
V2

DIP switch with 8 micro switches for configuration

Validation pushbutton (BPV)

SIM memory card

3- Functions of the safety receiver «RSRA»

Receiver RSRA

Removable connection block, screw terminals

White indicator lights V1 and V2 «State of safety receiver»

Green indicator lights K1 and K2 «State of safety relays»

Removable front panel for configuration

Red indicator light V3 «Wrong identity code or diagnostic»

BNC plug for BNC antenna extensions and BNC antennas

Green indicator light V4 «Radio reception quality»

RADIOSAFE
RSRA

| S11 S13 | S22 S24 S23 | A3+ A2- A5+ |
| A1+ 48 S12 S14 | S21 13 23 33 | 17 27 37 IR |

V1 V2
13 K1 K2 14
23   24
33   34

| A2- 58 S32 S34 | S42 14 24 34 | 47 57 67 77 |
| S31 S33 | Y1 Y2 | A4+ A2- |

4- Product configuration

All programmings are easily made with a DIP_switch (8 micro-switches) located in front of the transmitter. A simple push on validation button (**BPV**) can quickly configure and associate the transmitter to the receiver.

List of possible configurations:

➡ Selection of the transmitter restart mode after a reactivation of its safety input :
  - **«manual» :** wiring a restart pushbutton on the transmitter input No. 17.
  - **«automatic» :** the transmitter will automatically restart.

➡ Frequency channel selection of the transmitter (the receiver will also receive a change order of frequency) :
  - **64 frequency channels for the standard range transmitter.**
  - **25 frequency channels for the extended range transmitter.**

➡ Configuring the check function for inputs E1 to E10 after reactivation of the safety input :
  - **function «enabled» :** the 10 function inputs of the transmitter are checked and must be in NO position. If a problem is detected, the radio emission is not activated and the lights V1 and V2 indicate an error.
  - **function «disabled» :** state of the inputs is not controlled.

5- Technical characteristics

5.1- Safety transmitter RSEF

Mechanical characteristics and environmental withstand capacity
Housing material : Plastic
Protection index : IP 40
Weight : 500 g
Operating temperature range : -20 °C to + 50 °C
Storage temperature range : - 30 °C to + 70 °C
Connection : Screw terminals for wires 0.08² to 2.5²
Antenna : 1/4 wave, plug-in on BNC connector, ref : **VUB084**

Radio characteristics
Radio transmit frequencies : (Interval between adjacent channels : 0,025 MHz) **RSEF40** : 64 frequencies, from 433,100 MHz to 434,675 MHz **RSEF41** : 25 frequencies, from 434,075 to 434,675 MHz
Transmit power : ≤10 mW
Average range in typical industrial environment (1) : **RSEF40** : 150 m **RSEF41** : 250 m

Electrical characteristics
Power supply voltage : 24 V DC SELV/PELV +/- 20%
Max. consumption : 500 mA
Number of inputs : 13 - 2 safety inputs (emergency stop, safety light barrier etc…) - 10 function inputs - 1 «restart» input
Low level on input : DC Voltage < 2 V
High level on input : DC Voltage > 3 V
Maximum voltage level on an input with no damage : 30 V
Consumption of an input active in the high state : < 20 mA
Maximum frequency of a signal on an input : 10 Hz max
Static outputs : - **Number and type of outputs :** 2 PNP outputs (images of indicator lights V1 and V2) - **Output voltage :** 24 V DC, 100 mA max.
Indication : 3 indicator lights

(1) = Range varies according to environment conditions of transmitter and of receiver antenna (frameworks, metal partitions, etc.).

5.2- Safety receiver RSRA

Mechanical characteristics and environmental withstand capacity
Housing material : Plastic
Protection index : IP 40
Weight : 500 g
Operating temperature range : -20 °C to + 50 °C
Storage temperature range : - 30 °C to + 70 °C
Connection : Screw terminals for wires 0.08² to 2.5²
Antenna : 1/4 wave, plug-in on BNC connector, ref : **VUB084**

Electrical characteristics
Power supply voltage : 24 V DC SELV/PELV +/- 20%
Max. consumption : 120 mA (non-loaded static outputs)

Safety relay outputs (K1 and K2) :
 	
Contacts : 3 NO forcibly guided contacts
 	
Tripping time (reaction) :
• <u>Active stop time</u> following activation of transmitter safety input : 50 ms
• <u>Passive stop time</u> :
  - 300 ms for emergency stop according to EN 60204-1,
  - 1.5 s for a safety stop according EN 60204-32 para 9.2.7, If the requirement of the risk analysis allows it. (2)
 	
Max. switching voltage. : 250 V AC
 	
Switching capacity :
• Per AC 15 : AC 3 A / 230 V for NO contacts EN60947-5-1
• Per DC 13 : DC 8 A / 24 V at 0,1 Hz EN60947-5-1
 	
Electrical service life :
• Per AC15 at 2A, AC230V : 100 000 cycles EN60947-5-1

Static outputs : **Number and type of outputs :** 6 PNP outputs **Output voltage :** 24 V DC, 100 mA max.
Indication : 6 indicator lights

(2) = In this case, an emergency stop button must be wired on the safety input "S11-S12 and S13-S14"

6- «Start-up by IR validation» option

If the risk analysis of the application requires it, the start-up zone for an equipment and its identification can be secured by an IR validation on start-up.

Functioning principle :

- To start the equipment (x), the **UJF** infrared transmitter module connected to the safety transmitter **RSEF** must be placed in the reception area of the IR receiver module **UDF** connected to the safety receiver **RSRA**.

- Once the validation has been carried out, control commands can be transmitted within the radio range.

- The IR start-up function has an action range of 0 to 10 m.

  Note : The cable used for interconnection between the IR modules and the safety units has a length of 10m. This length can be extended up to 30m (max.) using shielded extensions referenced : **UDWR10**.
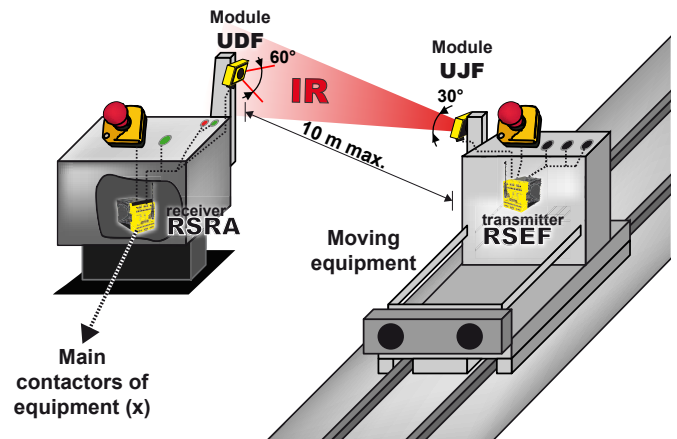
NB : This option is only available for receivers **RSRA** equipped with this functionality.

7- Setting the safety receiver

Following application encountered, the receiver restart mode can be programmed.
Access to this setup is done by removing the front panel of the receiver :

Safety receiver **RSRA**
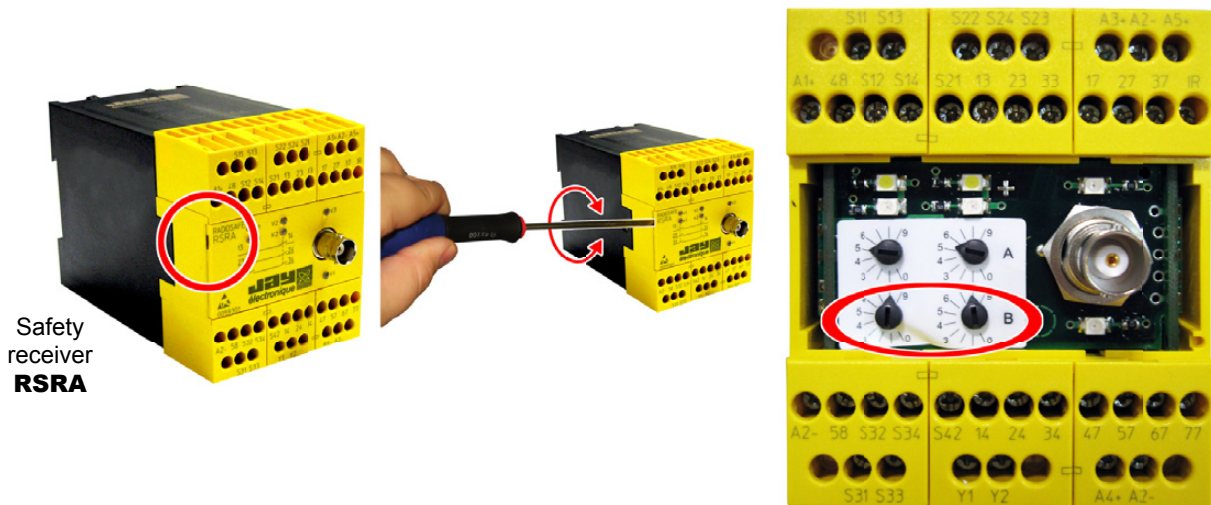
The receiver has 2 programs which can be configured using the two «**B**» rotary selector switches.

Position of « B » selector switches	Receiver restart mode after a deactivation of the receiver safety input nb.1 (wired on receiver terminals «S11 to S14»)	Receiver restart mode after a deactivation of the transmitter safety input (wired on transmitter terminals nb «7 to 10») or loss of radio link	Start-up by IR validation	Remarks
1	Manual	Manual	YES, possible (If requested by application risk analysis)	Manual restart mode to be privileged
2	Automatic	Automatic		Automatic restart mode to be privileged

8- Typical wiring diagrams

8.1- Typical wiring diagram for the safety transmitter RSEF

Typical wiring diagram with :
- 1 emergency stop button connected on the safety input,
- 1 «restart» pushbutton,
- 10 dry contact inputs (ex. : NO contact pushbutton).

(1) = External indicator light reflecting transmitter indicator lights V1 and V2 (outputs 11 and 12 : 24VDC, 100mA max.)
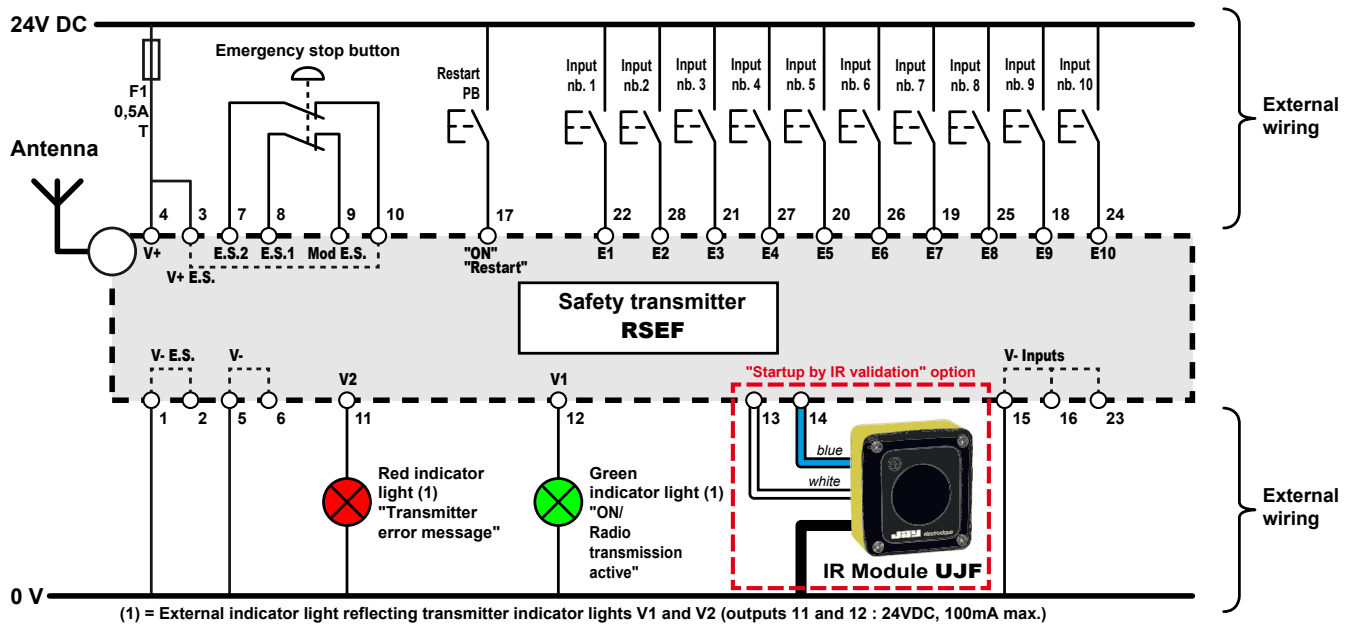
8.2- Typical wiring diagram for the safety receiver RSRA

Typical wiring diagram with :
- 1 «restart» pushbutton,
- possibility of implementing an emergency stop button connected to the safety input (**a1**).
- possibility of monitoring main contactor contacts C1 and C2 connected on safety outputs K1 and K2 (**a2**). This monitoring depends on the safety performance level required by the equipment.

(1) = Indicator light of indicator light column (outputs 58, 48 and 14 : 24VDC, 100 mA max.)
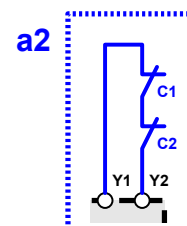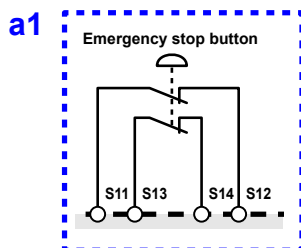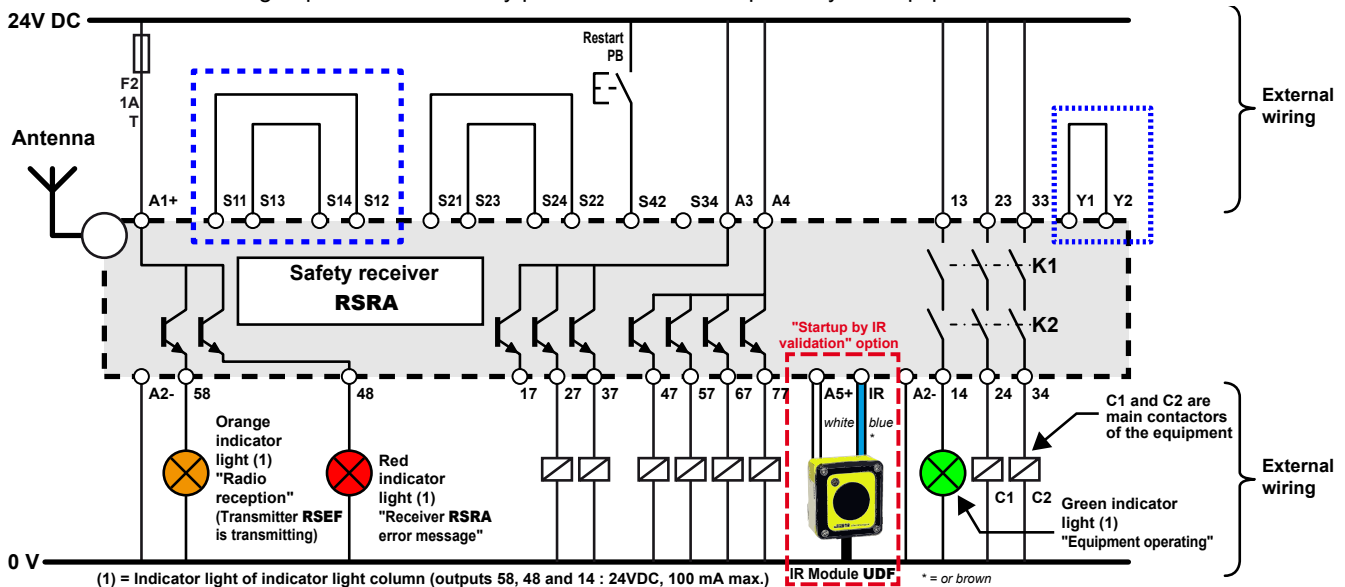
8.3- Assignment of inputs connected to transmitter RSEF and static outputs of receiver RSRA

Receiver **RSRA** with «**standard**» output assignment
(ref.: **RSRAxSxxx**)

Transmitter RSEF inputs	Receiver ouput assignment (terminal No.)					
	27	37	47	57	67	77
E1	X					
E2		X				
E3			X			
E4				X		
E5					X	
E6						X
E7						
E8						
E9						
E10						

Receiver **RSRA** with «**combined**» output assignment
(ref.: **RSRAxCxxx**)

Transmitter RSEF inputs	Receiver ouput assignment (terminal No.)					
	27	37	47	57	67	77
E1	X				X	
E2		X			X	
E3			X		X	
E4				X	X	
E5					X	
E6	X					X
E7		X				X
E8			X			X
E9				X		X
E10						X

9- Product dimensions

Safety transmitter RSEF
Safety receiver RSRA

118

84

11

67
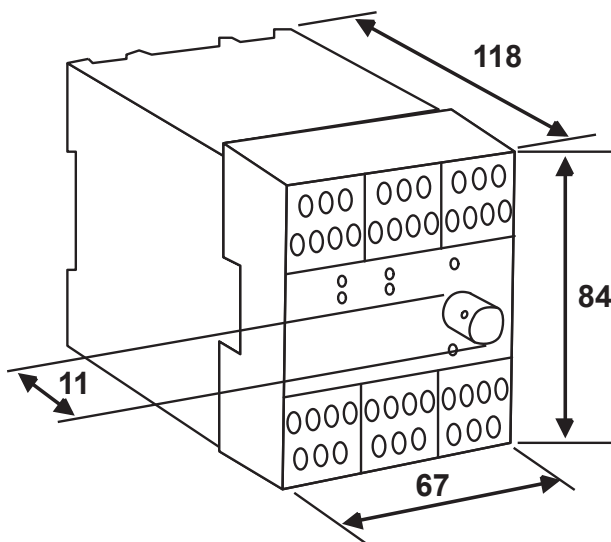
unit = mm

Infrared transmitter module UJF
Infrared receiver module UDF
(for «Start-up by infrared validation» option)

62

64

45

51

Mounting bracket

Ø5

Ø6

12

R= 24

30°

64

46

14

Plug-in BNC antennas VUB•••

210

335

VUB084 1/4~

VUB086 1/2~

(Only usable on receiver **RSRA**)
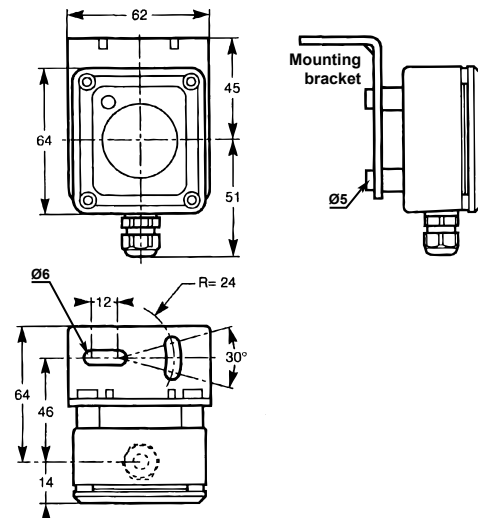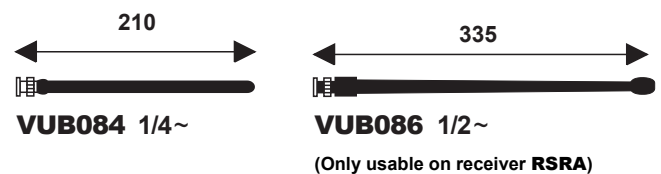
10- Selection guide, references for ordering

The **RS Series «Wireless safety logic signal transmission system»** must be ordered as separate elements :

Element	Picture	Reference	Delivered with
Safety transmitter		**RSEF40-0** Transmitter with standard range	- SIM card (installed) - CD (user manual) - 90° BNC elbow **VUB060** - BNC Antenna **VUB084** - Ant. extension 0,5 m **VUB170**
		RSEF41-0 Transmitter with extended range	
Safety receiver		**RSRA2SA0-0** - 6 «standard» outputs - Passive stop : 0,3 s.	- 90° BNC elbow **VUB060** - BNC Antenna **VUB084** - Ant. extension 0,5 m **VUB170**
		RSRA2SB0-0 - 6 «standard» outputs - Passive stop : 1,5 s.	
		RSRA3SB0-0 - 6 «standard» outputs - Passive stop : 1,5 s. - Programmed with «Start-up by infrared validation» option *	
		RSRA2CB0-0 - 6 «combined» outputs - Passive stop : 1,5 s.	

***** = *The infrared transmission module ref.:* **UJF** *and the infrared receiver module* **UDF** *must be ordered separately*

Accessories	Picture	Reference	Description
SIM card		**RSWF21P**	Programmed on delivery
IR transmission module UJF (for «Start-up by IR validation» option)		**UJF1**	Connection to transmitter **RSEF** Supplied with 10m cable
IR receiver module UDF (for «Start-up by IR validation» option)		**UDF1**	Connection to receiver **RSRA** Supplied with 10m cable
Extension cable kit for IR Module UDF		**UDWR10**	10 m extension cable
Antennas		**VUB084**	1/4 wave BNC plug
		VUB086 * *	1/2 wave BNC plug
Antenna elbow		**VUB060**	90° BNC elbow
Antenna extension cables		**VUB170**	Length 0,50 m BNC plug (without support)
		VUB105	Length 2 m BNC plug (with support)

* * = *Only usable on receiver* **RSRA**.

The products presented in this document are subject to change. Product descriptions and characteristics are not contractually binding.
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